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WMSC Commissioner Brief: W-0065 – Serious Injury – Vent Shaft FF2 – September 9, 2020

Prepared for Washington Metrorail Safety Commission meeting on March 2, 2021

Safety event summary:

A Metrorail contractor replacing grates in Vent Shaft FF2 (on the National Mall between L'Enfant Plaza and Archives stations) fell approximately eight feet to the bottom of a drainage pumping station pit, resulting in a broken leg and broken nose.

Both members of the contractor team had fall protection training, but they did not utilize any protection.

The two-person team working on the grates did not tag grating as secured, so it was not clear which grates had been secured and which had not. The fans remained on during the work, which made communication difficult over the loud noise. The lack of tags and the fans remaining on were both contrary to their standard practice.

The investigation showed that Metrorail allowed the work to be conducted without fall protection required under Occupational Safety and Health Administration (OSHA) regulations. Metrorail also did not implement and allowed its contractor to not follow WMATA's Drug and Alcohol Policy and Testing Program. Neither the injured contractor nor the other member of the team, a foreman, underwent post-incident testing.

Probable Cause:

The probable cause of this event was a lack of WMATA oversight of contractors and a lack of work planning to properly identify safety risks including the need for fall protection under OSHA regulations and the communication challenges created by the loud, ongoing fan operation.

Corrective Actions:

SAFE directed the contractor's company, M&M Welding & Fabricators Inc. to develop a "Lessons Learned" document and conduct a safety standdown focused on fall protection.

SAFE also directed its construction oversight team to conduct site visits to ensure personnel are trained, qualified and utilizing appropriate protective equipment, such as fall protection, for tasks being performed.

WMSC staff observations:

Metrorail should not limit a "Lessons Learned" document and safety stand down to a single contractor when substantially similar risk exists for similar work being conducted by other contractors and Metrorail employees that requires fall protection.

Metrorail should consider a rule, procedure or policy providing for fans to be turned off when workers are in ventilation shafts or specifying limited circumstances where fans can or should be on while workers are there.

Metrorail could also consider establishing more specific policies on the tagging of grates during replacement work.

Staff recommendation: Adopt final report.

Washington Metro Area Transit Authority

Department of Safety and Environmental

Management (SAFE)

FINAL REPORT OF INVESTIGATION A&I E20338

Date of Event:	9/9/2020
Type of Event:	Serious Injury
Incident Time:	03:18 hrs.
Location:	Archives Station, Vent Shaft F22
Time and How received by SAFE:	03:32 hrs., On-Call Phone
WMSC Notification Time:	05:12 hrs.
Rail Vehicle:	N/A
Injuries:	Fractured tibia and a broken nose
Damage:	None

Archives Station – Serious Injury

September 9, 2020

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Abbreviations and Acronyms

ARS	Audio Recording System
CFR	Code of Federal Regulations
DPS	Drainage Pumping Station
MOC	Maintenance Operations Center
MSRPH	Metrorail Safety Rules and Procedures Handbook
NOAA	National Oceanic Atmospheric Administration
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
ROCC	Rail Operations Control Center
SAFE	Department of Safety and Environmental Management
WMATA	Washington Metropolitan Area Transit Authority

Executive Summary

On Wednesday, September 9, 2020, at approximately 03:18 hrs., a Contractor assigned to remove and replace grates in Vent Shaft FF2 kneeled over to remove the grates, lost their balance and fell into the Drain Pump Station (DPS) pit. The Contractor fell through an opening left by a grating previously removed, approximately eight feet to the bottom of the DPS pit. The Rail Operations Control Center (ROCC) received a Contractor injury notification requiring medical transport at Archives Metro Station, Vent Shaft FF2. The Contractor was transported to George Washington University Hospital for medical attention and was later diagnosed with a fractured tibia and broken nose as a result of the incident.

Upon analysis of data collected from M&M Welding & Fabricators Inc., a review of submitted documentation and informal interviews with staff was conducted. Based on a review of OSHA regulations, the Contractor was not in compliance with the following OSHA Standard:

(1) 29 CFR 1925.501(b)(2)(ii), "Each employee on a walking/working surface 6 feet (1.8 m) or more above a lower level where leading edges are under construction, but who is not engaged in the leading-edge work, shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system. If a guardrail system is chosen to provide the fall protection, and a controlled access zone has already been established for leading-edge work, the control line may be used in lieu of a guardrail along the edge that parallels the leading-edge."

The probable cause of this event was a lack of WMATA oversight of contractors and a lack of work planning to properly identify safety risks including the need for fall protection under OSHA regulations and the communication challenges created by the loud, ongoing fan operation.

As a result of this investigation, SAFE makes the following recommendations:

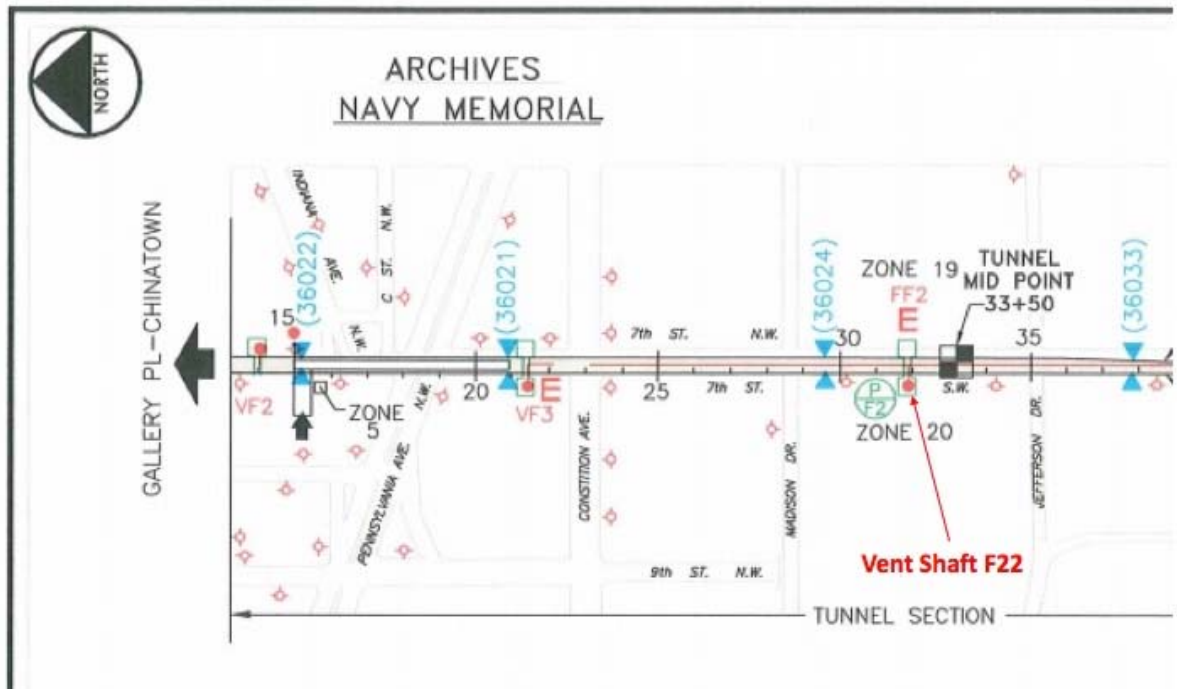
To M&M Welding & Fabricators Inc., develop Lessons Learned and conduct a safety stand-down with an emphasis on fall protection. Also, assign personnel with the responsibility of safety oversight for the duration of the project.

To SAFE Construction, conduct site visits to ensure personnel are trained, qualified, and utilizing appropriate PPE for tasks being performed.

Incident Site

Archives Station, Vent Shaft FF2

Field Sketch/Diagram



Purpose and Scope

The purpose of this incident investigation and candid self-evaluation is to collect and analyze available facts, determine the probable cause(s) of the incident, identify contributing factors, and make recommendations to prevent a recurrence.

Investigative Methods

The investigative methodologies included the following:

- Physical Site Assessment
- Formal Interviews – SAFE interviewed two individuals as part of this investigation. Interviews included persons present at, during, and after the incident, those directly involved in the response process. SAFE interviewed the following individuals:
    - Contractor
    - Foreman

- Documentation Review – A collection of relevant work history information and process documentation contained in Metro systems of record. These records include:
    - Contractor's Training Procedures & Records
    - Contractor's Certifications
    - Contractor's 30-Day work history review
    - Foreman's Training Procedures & Records
    - Foreman's Certifications
    - Foreman's 30-Day work history review
    - 29 CFR 1926 Subpart M – Fall Protection
    - National Oceanic Atmospheric Administration (NOAA)

- System Data Recording Review - A collection of information contained in Metro Data Recording Systems This data includes:
    - Audio Recording System (ARS) playback including Radio and Phone Communications

Investigation

Based on findings, the Contractor was working to replace grating in Vent Shaft FF2. While kneeling on the grating, the Contractor reached over to remove another grating piece; they lost their balance and fell into the pit. Fall protection and adequate Personal Protective Equipment (PPE) were not used in doing this work process and are required by OSHA 29 CFR 1926.501. The Contractor sustained a fractured tibia and a broken nose. The required PPE and fall protection should have been in place before work commenced.

Further ARS playback review verified that Maintenance Operations Center (MOC) received a call from a representative of M&M Welding & Fabricators Inc. requesting to turn off the fans in the vent shaft and to report the Contractor injury.

Chronological Event Timeline

Time	Description
22:00:00 hrs.	Contractor work crews accessed DPS F03 to commence work.
03:19:11 hrs.	MOC received a call to turn off fans in DPS F03 due to an injured worker and could not communicate with them in the shaft.
03:22:15 hrs.	MOC confirmed fans are turned off in the vent shaft. The caller reports the RWIC call sign. The Contractor's work crew was completing the DPS Rehab Project and entered the vent shaft from the street. Injuries unknown at this time. The inspector on-site contacted caller to call ROCC.

Interview Findings

Based on the investigation, SAFE conducted two interviews. These interviews identified the following key findings associated with this event, as follows:

The Contractor stated they were trained and certified in fall protection; however, they chose not to use fall protection due to not being close to the vent shaft edge while performing the job assignment. The Contractor reported that the grating was being leveled. Past practice was to tag it as being secured; however, this practice was not used for this assignment. It was not possible to differentiate between the secured and unsecured grates.

The Foreman reported the fans were turned on in the vent shaft while work was commencing. The fans were reported to be very loud, causing a communication distraction between the employees and made effective communications nonexistent. The Foremen stated standard practice was to have the fans turned off before working in the vent shafts; however, they never requested to turn have the fans turned off in Vent Shaft FF2. Although both workers were trained and certified in using fall protection, they did not use fall protection for this work assignment.

Findings

- The Contractor did not use fall protection while working near the vent shaft, which was 8 feet below ground. This is not in compliance with 29 CFR 1925.501(b)(2)(ii), "Each employee on a walking/working surface 6 feet (1.8 m) or more above a lower level where leading edges are under construction, but who is not engaged in the leading edge work, shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system. If a guardrail system is chosen to provide the fall protection, and a controlled access zone has already been established for leading-edge work, the control line may be used in lieu of a guardrail along the edge that parallels the leading edge." The Contractor was not wearing fall protection while working in the vicinity of a floor opening.
- The Foreman did not ensure adequate fall protection was available and being used for the work assignment.
- Vent shaft fans were not turned off before work commenced and caused a communication distraction between workers.

Weather

At the time of the incident, NOAA recorded the temperature at 69°F with low clouds and 94% humidity. SAFE has concluded that weather was not a contributing factor in this incident (Weather source: NOAA – Location: Washington, DC.)

Human Factors

Fatigue

Based on SAFE's interview questions related to Fatigue Factors and review of the Contractor's and Foreman's 30-day work history, it was determined the Contractor's and Foreman's 30-day work schedules leading up to the incident were compliant with WMATA's Policy/Instruction 10.6/1 Hours of Service Limitations for Prevention of Fatigue and did not present a significant risk of impairment due to fatigue. Based on formal interviews, no personal factors would have increased the likelihood of fatigue-related impairment. Both workers had no history of sleep issues to report.

Post-Incident Toxicology Testing

The Contractor did not undergo Post-Incident Toxicological Testing due to being admitted to the hospital.

The Forman did not undergo Post-Incident Toxicological Testing.

Probable Cause Statement

The probable cause of this event was a lack of WMATA oversight of contractors and a lack of work planning to properly identify safety risks including the need for fall protection under OSHA regulations and the communication challenges created by the loud, ongoing fan operation.

SAFE Recommendations

As a result of this investigation, SAFE makes the following recommendations:

To M&M Welding & Fabricators Inc., develop Lessons Learned and conduct a safety stand-down with an emphasis on fall protection. Also, assign personnel with the responsibility of safety oversight for the duration of the project.

To SAFE Construction, conduct site visits to ensure personnel are trained, qualified, and utilizing appropriate PPE for tasks being performed.

Appendix A - Interviews

Interview Details

Contractor

This employee is a WMATA Contractor with eleven (11 years of experience as a Plumber and one and three quarter (1 ¾ years of service with M&M Welding & Fabricators Inc. as a Plumber. The Contractor's last certification in Fall Protection and Confined Space Training was in January 2020 and has no history of sleep issues to report.

Based on the SAFE interview, the Contractor stated the job task was installing new grating in Vent Shaft FF2. While kneeling on the grating, the Contractor said they were working near a confined space area, approximately ten (10 feet above the ground inside of the DPS Vent Shaft FF2. Upon attempting to level the grating, the Contractor stated they lost focus of the area they were kneeling and subsequently fell in the shaft. The Contractor added this was the first time they had performed the task of fitting this particular type of piping and had a few safety concerns. The Contractor reported that these safety concerns were not addressed or brought to the attention of the Foreman. The Contractor stated they were fall protection certified; however, a decision was made not to use fall protection as they were not working inside the shaft or close to the edge of the shaft. The usual method in which the Contractor performed similar job assignments was to tag the grating that was not secured to be identified as such. During this assignment, the grating was not tagged, and the Contractor could not determine if the grating was secured by looking at it. As the Contractor reached for one end of grating, they stated they lost balance and fell into the shaft, approximately 10 feet, and suffered injuries requiring transport to the emergency room.

Foreman

This employee is a WMATA contractor with ten (10 years of experience as a Foreman and over two (2 years of service with M&M Welding & Fabricators Inc. as a Foreman. The Foreman's last certification in Fall Protection and Confined Space Training was in December 2019 and has no history of sleep issues to report.

Based on the SAFE interview, the Foreman stated before work commenced, the Safety Superintendent for M&M Welding & Fabricators Inc; conducted a safety briefing; however, they could not recall what was stated in the safety briefing. At the time of the incident, the Foreman reported they were working alongside the Contractor who suffered a severe injury. It was reported that both workers were leveling grating to be installed on Vent Shaft 22. The Foreman stated they were inside the DPS pit on a ladder as the Contractor was kneeling on the concrete surface outside of the vent shaft and assisting with moving the grating into the correct position. The Forman stated that most of the grating and support beams were already installed. They were tasked with leveling the grating on top of the support beams. As the Foreman instructed the Contractor, which grating to lift, the Foreman stated the Contractor could not hear the instructions due to the vent shaft fans being extremely loud. The Foreman reported the Contractor

lifted the grating's undesired end, and they corrected the Contractor to lift the opposite side. The Foreman said that as they looked down to ensure the grating was in the proper position, upon returning their view to above the DPS's surface, they witnessed the Contractor falling into the vent shaft. The Foreman reported they were trained and certified in fall protection but elected not to use fall protection due to the job assignment's nature. The Foreman stated they were not working directly in the vent shaft and felt fall protection was not needed. After the incident occurred, the Foreman called the Safety Superintendent to notify them of the incident. The Foreman reported the injured Contractor was fully alert when the incident occurred, and it may have been prevented if the fans were turned off or utilized fall protection for this assignment.

Appendix B - Attachments

Attachment #1 – Supervisor Report of Accident (page 1)

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
Supervisor's Report of Accident ~ Form C-24

1. Contract # FQ17080	2. WMATA Project Section (Example: F-10a) FF-2 Fan Shaft - F03-1 DPS	
3. Date of Accident 9-9-20 ; M & M Welding and Fabricators, Inc. m	4. Date Supervisor Notified 9-9-20	5. Date of the Report 9-9-20 Rev 1
6. Name of Prime Contractor M & M Welding and Fabricators, Inc.	7. Location On-Site Where Accident Occurred Track Level/Dry Pit at F03-1 DPS	
8. Name of Contractor/ Subcontractor Involved	9. Injury: O Lost Time ☒ Medical Treatment Off-Site	
10. Narrative of How Accident Occurred:* While kneeling on the grating, he reached over to move another piece of grating out of the way. He lost his balance and fell into the dry pit of the DPS.	O Fire O Property Damage O Equipment Damage	

Report of Accident or Damage to Equipment/Property

11. Injured Name & Address [redacted]	Employer Name & Address M & M Welding and Fabricators, Inc. 2701 Back Acre Circle Mount Airy, MD 21771	12. Injured Occupation Plumber ☒ Male O Female Age 41
13. Nature of Injury Fall	14. Part of Body Injured Fractured Nose, Left Leg Injury	15. First Aid By Whom? EMT
16. Medical Treatment By Whom? George Washington University Hospital	17. Name(s) of Witnesses [redacted]	
18. Accident-Basic Type** Fall from Different Level	19. Immediate Causes** Failure to use PPE	20. Basic Causes** Distractions
21. Supervisor's Corrective Action and Signature Must wear safety harness and all proper PPE		
22. Project Superintendent's Review Comments and Signature [redacted]		
23. WMATA Resident Engineer's Comments and Signature		

*Use additional paper, if needed. **See reverse side.

Form C-24 continued…..

Accident Cause Analysis Flow Chart		
ACCIDENTS	IMMEDIATE CAUSES	BASIC CAUSES
<u>Basic Types</u> - Struck by… - Struck against… - Contact with… - Caught on… - Caught in or between… - Fall on same level… - Fall from different level… - Exposure… - Over-exertion… - Other…	- Operating without authority - Failure to warn or secure - Operating at unsafe speed - Nullifying safety devices - Using defective equipment - Using equipment improperly - Failure to use personal protective equipment - Improper loading or placement - Servicing equipment in motion - Servicing hazardous equipment - Horseplay - Inadequate guards or protection - Defective equipment or material - Congestion or inadequate work space - Fire and explosion hazards - Unexpected movement hazards - Projection hazards - Poor housekeeping - Hazardous environmental conditions - Hazardous placement or storage - Inadequate ventilation - Inadequate illumination - Unsafe personal attire	<u>Personal Factors</u> - Lack of knowledge or skill - Improper motivation attempting to: a) Save time or effort b) Avoid discomfort c) Attract attention d) Assert independence e) Seek group approval f) Express hostility - Physical or mental problem - Distractions <u>Job Factors</u> - Inadequate work standards - Inadequate design - Inadequate maintenance - Inadequate purchasing standards - Normal wear and tear - Abnormal use and wear

Distribution: Original – SAFE
Copies – Insurance Carrier, WMATA Authority Representative

C-24 (rev. 10/11)

SAFETY ORIENTATION AND HAZARD COMMUNICATION PROGRAM TRAINING

***Personal protective equipment (PPE)** ***Fall Protection**

***Respirator Safety** ***Confined Space** ***Silica in Construction**

PRINT NAME	SIGNATURE
[redacted]	[redacted]

M&M Welding: [redacted] DATE 9/17/2020

Attachment #4 – Photo of Vent Shaft 22 from 7th Street NW, Washington DC.